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ABSTRACT

The development of children's language skills was studied in an experimental research project involving programmed versus incidental instruction in a prekindergarten program. It was hypothesized that children who attended a prekindergarten with programed instruction would score significantly higher on language skills tests than would a comparable group of children receiving incidental instruction. Subjects for the study were 43 4-year-old children, randomly assigned to one of three prekindergarten groups, two experimental and one control. All the children were from white, English-speaking, middle-class families with an unusually high parental educational level. The curriculum for the experimental groups was based on behavioral objectives implemented through daily lesson plans. The control group curriculum was based, at the start, on the traditional nursery school approach, with behavioral goals not explicitly defined in any curriculum area. Although post-testing results showed no apparent significant difference in language skills between the experimental and control groups, the negative findings were attributed to intervening factors: (1) the control group program had been altered, contrary to the original plan, offering the control children language opportunities quite similar to those of the experimental groups; (2) teachers in the experimental groups were not sufficiently familiar with techniques of programmed teaching; and (3) the programmed curriculum manuals had been designed for disadvantaged children. Results showed that specific and well-defined behavior management and direct teaching techniques, with a curriculum based on explicit behavioral objectives, are not in themselves sufficient to effect a significant change in either language skills scores or intelligence quotients of 4- and 5-year-old children. The study also showed that a language development program designed for disadvantaged children is not appropriate for middle class children with college-educated parents. (Author/BF)

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PROGRAMMED VERSUS INCIDENTAL TEACHING IN THE PREKINDERGARTEN

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by

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Since the beginning of experimental research on the developing child, little has been done to investigate the effects of experience or specific training on cognitive growth. The delay in research in our culture probably has been due to some long entrenched assumptions, the first of which has been a belief in the fixed intelligence of the child. This assumption had some empirical support in the IQ tests developed in the early part of the 20th century, since the results of these tests seemed to show that an individual's IQ remained fairly constant. This belief is no longer tenable, since studies have been conducted that indicate, both from a developmental and a physiological point of view, that the IQ can be increased through stimulation intervention.

A second deterrent to research on cognitive growth has been a belief in predetermined development. It is now known that development is far from predetermined. A number of studies have been conducted, both with animals and with human babies, which show that sensory deprivation can seriously impair the physical and intellectual development of a child, and conversely, that sensory stimulation enhances development.

A third assumption has been that the structure of the brain was static, that it resembled a switchboard and information was "plugged into" certain outlets. Now the brain is no longer considered to be a static organ, but rather a dynamic one with countless "bits" of information constantly being added to it.

As the results of recent research are published, there is a subtle but definite shift toward increased interest in the merit of, and even

the necessity for, specific intellectual stimulation during the early years of childhood.

A review of research on teaching in the nursery school reveals that principal concerns in the past have been with the physical, emotional and social development of the child. A few studies have investigated IQ scores, or the development of language skills in the young child. But not until about five or six years ago were researchers earnestly concerned with examining the cognitive development and training of the prekindergarten child. Studies that have been conducted with Head Start and other disadvantaged children are beginning to provide evidence that in order to effect significant long-range changes in young children's learning, we are faced with the necessity of determining new criteria for educational programs, finding what needs to be learned, and how to go about teaching it most effectively.

Experimental projects in early education are often concerned with WHAT to teach in prekindergarten, but very little has been done about HOW to teach. B. F. Skinner maintains that it is not true that the "two essentials of a good teacher are enthusiasm and a thorough knowledge or an interest in the subjects" (Skinner, 1954). Something more is needed, and this is knowing how to teach. Teachers need to know what to do or say in a specific situation so they will know that desired and specific results can be produced. They need to learn the techniques for changing behavior, and the criteria for determining when the behavior has been changed. One way to accomplish this goal is through the use of programmed teaching.

Bereiter and Englemann have taken the position that the human factor is vital in programmed instruction and have developed some innovative teaching techniques that incorporate some of the elements of programmed

learning. The programmed instruction technique developed by Bereiter and Englemann features fast-paced lessons, task-oriented lessons, a strong emphasis on verbal response and programmed lessons--that is, lessons which are carefully planned in small-step instructional units with continual feedback from the children. Opportunities for successful experiences are maximal. Mistakes are anticipated and attempts are made to avoid them. Finally, the children are reinforced frequently, not only for correct responses, but for trying and thinking and for appropriate deportment.

Perhaps the first step in setting up an early childhood learning program is to establish well-defined behavioral objectives since they provide not only the goal toward which to teach but also the means by which the goal is reached. A prekindergarten program should provide deliberate opportunities for a child to learn the basic skills of his language such as labeling, categorizing, simple deductions, implausibility, probability, and relationships. He needs to learn fundamental math procedures and concepts. He needs to learn basic colors, shapes and textures and how to use various art mediums to express his artistic feelings. He also needs to learn what behavior in his repertoire is appropriate in the classroom and gives him the reinforcement that he seeks.

With some of the foregoing ideas in mind, an experimental research study was planned and put into effect in the Human Development Laboratories of Brigham Young University during the 1968-69 school year. Several studies evolved from the project. The particular aspect which concerned the author was that of the development of children's language skills. Specifically, it was hypothesized that children who attended a prekindergarten in which programmed instruction (as described above) was used as a

teaching technique would score significantly higher on language skills tests than would a comparable group of children who attended a prekindergarten where incidental instruction was used.

Subjects for the study were 43 four-year-old children who had been randomly assigned to one of three prekindergarten groups. Two experimental groups had 14 and 15 children respectively and the control group had 14. All of the children came from white, English speaking, middle-class families. All the parents were married and living together. The educational level of the parents was unusually high. Ninety-three percent of the fathers had a year or more of college. Seventy percent were college graduates and 53% had either a masters or a doctoral degree. Of the mothers, 91% had a year or more of college and 47% had graduated from college. The children had an unusually wide and varied background of experiences and all were highly verbal and could talk about their experiences.

The head teachers in the study were graduate assistants who had all had experience in nursery schools or taught an elementary grade. Each head teacher was assisted by four to six student teachers who were in the labs for course credit. There was a new group of student teachers every eight weeks, which meant that there were four sets of teacher trainees during the school year.

The control group classroom's physical layout consisted of an area for block play and large-muscle activity, a housekeeping area, and an area with tables and chairs used for art work and activities using manipulative materials similar to those which might be found in a new elementary school classroom. The group remained in this location all year.

The curriculum in the control group was based on the traditional nursery school approach for the first eight weeks. Here the children

engaged in free-choice activities during the major portion of each school period. Behavioral goals were not explicitly defined in any curriculum area. Some concepts were developed by means of a daily theme, and in the story time. The major emphasis, however, was on the development of social skills and on opportunities to utilize motor skills.

At the beginning of the second eight-week period, the curriculum of the control group was altered by the head teacher without the knowledge of the research director. Behavior problems had developed with some of the children and the head teacher undertook a more structured daily schedule in an effort to eliminate them. There was less free play time and each day a specific concept that had been carefully outlined in advance was taught all the children. The story time was altered also and part of the time was used to let the children tell their own story from a picture or to show and tell about some item they had brought from home. The total effect of these changes was that additional time was provided the control children to talk to other children and to adults.

The two experimental groups were housed in widely differing facilities, but the physical set up and programs were as similar as possible. One group used the facilities of the main Human Development Labs, but "classrooms" were created by using block storage units as dividers. Each classroom contained a table and five chairs. Traditional nursery school toys such as blocks, cars, dolls, and housekeeping equipment were not used in the program. However, books were always on the bookrack, and picture puzzles were always available. Educational toys such as peg boards, sequence puzzles, plastic interlocking toys, and number games were set out each day to be used during a self-selected activity time. Extensive use was made of a wide assortment of musical and rhythm instruments, as were

all of the standard creative materials.

The second experimental group was located in a renovated house several blocks from the main campus. It had several upstairs rooms that were used as individual classrooms which were arranged with tables and chairs, books and educational toys as described above.

The children were in the classroom two and one-half hours a day. This time was divided into 15-minute periods. When the children arrived, they were free to talk to a teacher, have a book read to them, do an inlay puzzle, or play with manipulative toys that had been set out for that day.

When the first bell (an oven timer) rang, the children went to their assigned groups. Each small group was identified by a name tag of a particular color. Color groups were formed initially on the basis of the child's scores on the Peabody Picture Vocabulary Test and the Basic Concept Inventory but were later regrouped on the basis of their activity level. The curriculum area for study during each 15-minute period was outlined on a color-coded sign language chart. The signs were chosen to aid the children in reading the chart independently and in becoming responsible for determining which group they should attend next. Thus, if a child belonged to a red group, he would look on the chart and see that the first red class was math, so he would go directly to the "classroom" used for math. Each 15 minutes the children moved to another class, and another topic.

The curriculum for the experimental groups was based on behavioral objectives that were developed for each of three academic areas and for two aesthetic areas. The academic areas were reading. language, and mathematics. The aesthetic areas were music and art. By way of illustration,

several of the behavioral objectives for the language curriculum were:

At the end of a seven-month period, each child will be able to

- separate objects into appropriate categories when presented with a miscellaneous selection of objects,
- state the name of the object and the category into which the object fits when a given object is presented,
- select the spatial relationship requested by the teacher from a variety of choices,
- identify polar and multiple polar qualities of assorted objects presented to him,
- identify characteristics of a variety of objects presented to him.

From these and other objectives, daily implementation was made through the student teacher's lesson plans. Two basic approaches were used to teach the objectives. A very direct and structured approach was used to teach very specific concepts such as size, shape, categories and labels. The other lesson plan was less specific and was intended to encourage discussion, rather than precise feedback.

The lessons were presented at quite a fast pace but each teacher trainee had to find her own style of teaching. Strong emphasis was placed on the inquiry approach which would elicit discussion rather than a monosyllabic answer. First-hand experiences were stressed and student teachers were constantly encouraged to have visual aids as a teaching media. This did not mean just pictures. Things to hold, touch, smell, hear or to use in some way were almost always part of the lesson. The formal portion of the lesson was completed in about 12 minutes and the last three minutes were used for open and easy discussion with the children. Songs, finger-

plays or short stories that emphasized the day's lesson were sometimes used during these last few minutes.

Specific behavior management techniques were used in the experimental groups. One method was reinforcement, used to encourage the children to learn. Here the child was reinforced each time he behaved in a desirable manner. Undesirable behavior was extinguished by ignoring it. Desirable behavior consisted of attending to the teacher during learning time, answering loudly and clearly, responding with correct or appropriate answers, sitting reasonably quiet on a chair or in a circle, and not touching or otherwise distracting another child. At the beginning of the program, the primary reinforcer was an M&M, but later sugared cereals were used. Every time a child made a response that came close to the desired one, he was rewarded while simultaneously being told just what he had done that had earned the reward. Secondary reinforcers used were in the form of verbal praise for appropriate behavior. Such phrases as, "That was good work" or "You really tried hard on that one" were used. At the same time the verbal praise was given, some physical contact was made, generally a pat on the shoulder or the knee. All of the reinforcers were used for three weeks. At the end of that time, the desired behaviors appeared to be becoming established and the primary reinforcers were gradually withdrawn. The secondary reinforcer of physical contact was also gradually discontinued, but the verbal approval and praise were continued. The major goals of behavior management were to help each child take responsibility for his own behavior and to teach each child that there were logical consequences for each behavior.

The original hypothesis, which assumed that four-year-old children who had attended a prekindergarten in which programmed instruction was used

as a teaching technique would score significantly higher on language skills tests than would a comparable group of children who attended a prekindergarten where incidental instruction was used was tested by pre-testing and post-testing the children with the Peabody Picture Vocabulary Test and the Englemann Basic Concept Inventory. The pretesting was done by the teacher trainees who were to be the children's teachers, and the post-testing was done by students who were trained by the research director. Both tests were measured statistically by means of a one-way analysis of variance of the total raw scores. The raw scores were tested on the basis of the type of treatment used in a group, by sex, and by a combination of sex and treatment. In no instance was there an apparent significant difference in the language skills scores between the experimental groups and the control group. Therefore, the hypothesis was not confirmed.

What happened? The factors at work that resulted in a negative finding were:

- The control group got out of control - their program was altered unbeknownst to the research director and offered the children language opportunities quite similar in some respects to what we were trying to do in the experimental groups.
- It is probable that neither of the head teachers in the two experimental groups was sufficiently familiar with, nor trained in, the techniques of programmed teaching.
- The student teachers had to learn behavior management and direct teaching techniques "on the job." They did not come into the classroom with any preparation for the type of teaching they were required to do. They had to experiment to find what would work for them.

- The fact that there were four separate sets of student teachers during the year may have negatively influenced the continuity of the children's learning.
- The student teachers' backgrounds were extremely varied. Some had completed all their requirements for elementary certification including student teaching in a grade. Others had never had any contact with young children - not even in a family situation.
- The printed, programmed manuals used in the curriculum areas were specifically designed for use with disadvantaged children. It is possible that with children as advantaged as the ones in this study, more specific and challenging concepts needed to be identified and taught.
- In addition to the two tests mentioned, the children were given three other tests during a three-week testing period. It is possible they became "test-wise." Some of them were reluctant to go with the examiners and referred to the tests as "dumb games." It can only be speculated as to the effect such behavior might have had on the test results.
- The curriculum was designed for the group, and while individual needs were considered, there was no specific provision for individual teaching. Since some of the scores went up and some went down, it would appear that the curriculum based on group needs may not have met the needs of individual children.
- The limitation of the measurement instruments used.

What are the implications of a study such as this? The statistical results have told us that specific and well-defined behavior management

and direct teaching techniques, and a curriculum based on explicit behavioral objectives, is in and of itself, not sufficient to effect a significant change in either language skills scores or intelligence quotients of four- and five-year-old children. However, there are two implications which are of considerable importance. First, but not necessarily of primary importance, is the necessity for teachers to learn more effective and more efficient teaching techniques. New pedagogical skills need to be understood and incorporated into the teacher's repertoire before she enters the classroom as a fulltime teacher. In the case of student teachers, the mastery of these skills cannot be achieved without actual practice, but training in specific teaching methods based on ways children learn, CAN be provided to student teachers before they enter the pre-kindergarten classroom. Secondly, a set of behavioral objectives needs to be established before the school year begins, and a sequential, small-step by small-step curriculum built around these objectives. The needs of the individual child can be provided for within the framework of such a curriculum.

Summary and Conclusions

While the study did not provide any statistically significant information, it did re-emphasize some of the advantages of programmed instruction. From it the child benefits from individualized instruction in small groups where there is close contact with a teacher and ample opportunity to talk to, and to be heard by, an adult. Even more advantages accrue for the teacher trainee. Programmed instruction provides an opportunity to prepare and teach a lesson plan in a micro-teaching situation, and since the lesson is taught several times in succession, immediate feedback is obtained as to what does or does not work. The

small group situation enables the teacher trainee to observe a few children at a time and to gain a better understanding of them. With only a few children to work with at a time, the trainee is better able to apply her knowledge of behavior management.

The major lessons learned from this study were that a language development program designed for disadvantaged children is not appropriate for middle-class children with college-educated parents because they already know most of the concepts, and that a highly structured learning environment should be used sparingly with preschool children.

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